

Bereskin & Parr

INTELLECTUAL PROPERTY LAW

Appl. No. : 09/916,247
Applicant : COTE et al.
Filed : July 30, 2001
Title : CHEMICAL CLEANING BACKWASH FOR NORMALLY
IMMERSED MEMBRANES
TC./A.U. : 1723
Examiner : MENON, Krishnan S.

Docket No. : 4320-347
Customer No. : 001059



Confirmation No.: 9131

Board of Patent Appeals and Interferences
United States Patent and Trademark Office
P. O. Box 1450
Alexandria, Virginia 22313-1450

March 2, 2006

BRIEF IN SUPPORT OF APPEAL

Real Party in Interest

The Real Party in Interest in the present Appeal is Zenon Environmental Inc., the assignee, as evidenced by the assignment set forth at Reel 014916, Frame 0650.

Related Appeals and Interferences

Application Serial No. 09/425,234 is the parent of this application. Application Serial No. 10/461,687 is a continuation of Application Serial No. 09/425,234. Appeals are pending in both of those applications and may directly affect or have a bearing on the Board's decision in this appeal. Both of the related applications mentioned above are owned by Zenon Environmental Inc.

There are no related interferences.

Status of the Claims

Claims 1-25 have been cancelled. Claims 26-36 are pending and the subject of this appeal.

Status of Amendments

No amendments have been filed after the Rejection of October 5, 2005.

Summary of the Claimed Subject Matter

The Applicant's invention relates to a process for filtering water containing solids with membranes in a tank (page 5, line 19 to page 6, line 9; "liquid feed 14" or "tank water 22", "membranes 24" and "tank 20" shown in Figure 1).

The basic process involves five steps, (a) filling the tank with feed water to immerse the membranes (page 6, lines 1-2); (b) generating a filtered permeate at a permeate outlet and a retentate in the tank (page 7, line 9 to page 8, line 12; "permeate 36", "permeate outlet 38", "retentate 46" shown in Figure 1); (c) aerating the membranes to dislodge solids from the membranes (page 8, lines 13-22); (d) backwashing the membranes (page 8, line 23 to page 9, line 6); and, (e) draining the tank of the retentate (page 7, lines 26-29; page 8, lines 2-6).

These steps, (a) through (e), are performed in a repeated cycle. However, an additional step (f) of wetting the membranes with a cleaning chemical is performed in some or all of the cycles. Step (f) is performed at least once a week after or while draining the tank in a first cycle and without returning to permeation before starting a subsequent cycle (page 9, lines 19-24; page 18, line 21 to page 19 line 3). Because step (f) occurs within a cycle and at least once a week, a cycle, that is steps (a) through (e), also occurs at least once a week. Accordingly, a step of draining the tank of retentate (step (e)) occurs at least once a week.

Claim 28 modifies claim 26 in two ways. Firstly, claim 28 introduces a new step of performing recovery cleanings to increase the permeability of the membranes. Secondly, claim 28 states that the steps of claim 26 are performed between the recovery cleanings to reduce the rate of a decline in permeability of the membranes between the recovery cleanings. These aspects of the invention are discussed, for example, at page 17, line 21 to page 18, line 5. As discussed therein, the concentration and duration of the chemical wetting (step (f)) of claim 26 may be chosen such that the

permeability of the membranes continues to decline over an extended period of time even in the presence of the chemical wetting step, but the rate of this decline is reduced. A recovery cleaning is performed at the end of such a period of time to restore the permeability of the membranes. Accordingly, the cleanings of step (f), integrated into a filtration cycle as described in claim 26, are insufficient on their own to preserve permeability of the membranes over their service life (which is hopefully many years), but reduce the frequency at which recovery cleanings would otherwise be required (page 9, lines 7-17).

The other claims further define the invention of claims 26 or 28. Claim 27 shortens the frequency of the filtration cycles, including steps of draining retentate and wetting the membranes with a cleaning chemical, to one day or less (page 18, line 27 to page 19, line 3). Claims 29 and 30 describe the concentration of the cleaning chemical and duration of the wetting of step (b) of claim 26 (page 16, line 28 to page 17, line 20; page 18 lines 6-20). Claim 31 describes the frequency of the recovery cleanings of claim 28 (page 17, line 27). Claim 32 indicates that the process is used for producing drinking water and defines the class of cleaning chemical (page 9, lines 26-28; page 18, lines 6-9). Claim 33 states that the cleanings of step (f) of claim 26 are performed regularly and at about the same effectiveness (page 18, lines 19-20). Claim 34 states that the membranes are backwashed with permeate after being wetted with the cleaning chemical but before starting a new cycle, the effect of which is to rinse the permeate side of the membranes before withdrawing more permeate in the next cycle (page 10, lines 9-11). Claim 35 defines a method of delivering chemicals to the membranes, namely mixing a cleaning chemical into water flowing to the permeate side of the membranes (page 16, lines 12-16). Claim 36 describes hollow fiber membranes (page 6, line 24 to page 7, line 4; "membranes 24" as shown in Figures 1-4).

Grounds of Rejection to be Reviewed on Appeal

Claims 26-29, 31 and 33 were provisionally rejected for statutory double patenting in relation to claims 1 to 6 of co-pending application No. 11/106,681.

Claims 26-36 were provisionally rejected for obviousness-type double patenting

in relation to claims 7-29 of Application No. 11/106,681. These are both provisional rejections in relation to an application (11/106,681) filed after the application under appeal. Pursuant to MPEP 804, Parts IB 1 and 2, once these provisional rejections are the only rejections remaining in both this application under appeal and application 11/106,681, the proper course is to withdraw the provisional rejections in this application under appeal and convert the provisional rejections into non-provisional rejections in application 11/106,681. The Applicants submit that the provisional double patenting rejections therefore do not need to be reviewed on this appeal. This leaves three grounds of rejection to be reviewed on appeal as described below.

I. The Section 102(b) Rejection of Claims 26-36

Claims 26-36 were rejected under 35 USC 102(b) as being anticipated by Smith et al US Patent No. 5,403,479 (Smith '479). Claims 26-30, in an earlier form and before claims 31-36 were added, were previously rejected as being obvious in view of Smith et al. in an Office Action mailed May 16, 2003. This rejection was traversed by Applicants in a response filed July 16, 2003 in which the Applicants submitted that Smith teaches away from draining the tank. In the following Office Action of October 22, 2003, the obviousness rejection was not repeated and claim 26 was instead rejected for anticipation. On page 6 of that Office Action, the Examiner stated that, "the argument whether the Smith reference makes draining the tank obvious or not is addressed by changing the rejection of the claims". No rejections for obviousness were made in any subsequent Office Action. Accordingly, the Applicants understand that the rejection of claims 26-36 is purely on the basis of anticipation.

II. The Section 102(e) Rejection of Claims 26-28, 31 and 33-36.

Claims 26-28, 31 and 33-36 were rejected under 35 USC 102(e) as being anticipated by Del Vecchio et al. U.S. Patent No. 6,331,251 (Del Vecchio '251).

III. The Section 103 rejection of claims 29, 30 and 32.

Claims 29, 30 and 32 were rejected under 35 USC 103(a) as being unpatentable over Del Vecchio '251 in view of Smith '479.

The Examiner's Rationale

I. The Section 102(b) Rejection of Claims 26-36

The Examiner states that Smith '479 teaches that draining the tank is not necessary. However, the Examiner notes that Smith discusses a prior art process in which a tank is drained. The Examiner does not say that this prior art process has all of the elements of the present claims. Instead, the Examiner's argument, as the Appellants understand it, is that because Smith '479 discusses all of the steps of claim 26, but for draining the tank, in an inventive process, and also mentions draining a tank in a different prior art process, all elements of claim 26 are found somewhere in the Smith '479 specification. The Examiner further alleges that all of the additional elements of the dependant claims are found in Smith '479, some in relation to prior art processes and some in relation to the inventive process, and so these claims are also anticipated.

II. The Section 102(e) Rejection of Claims 26-28, 31 and 33-36.

The Examiner argues that a process in which a tank is drained to allow membranes to be soaked "once per month of normal operation or at more or less frequent intervals" anticipates claim 26 which requires draining a tank at least once a week and claim 27 which requires draining a tank at least once a day.

In relation to claims 28 and 31, the Examiner argues that a single "deep cleaning" step can simultaneously provide step (f) of claim 16 and the additional recovery cleaning steps of claim 28 and 31. In relation to claims 33, 34, 35 and 36, the Examiner argues that various additional references provide the additional claim elements.

III. The Section 103 rejection of claims 29, 30 and 32.

The Examiner applies Del Vecchio '251 to claim 26 as described in the Section 102(e) rejection above. The Examiner provides no reasons for the rejection of claims 29 and 30. In relation to claim 32, the Examiner alleges that Smith teaches the additional elements of claim 32.

ARGUMENT

I. The Section 102(b) Rejection of Claims 26-36 Regarding Smith '479

The Appellants submit, in brief, that the Examiner's rejection is improper for two reasons. The first reason is that anticipation requires disclosure of all of the claimed elements in combination as claimed whereas Smith '479 does not disclose a single process having all of the elements of claim 26. Instead, Smith '479 discloses a prior art process for the purpose of contrasting an inventive process against the prior art process. This does not constitute disclosure of a third process having all of the features of the prior art and all of the features of the inventive process. The second reason is that many of the Examiner's cited references fail to disclose the claim elements that they are alleged to disclose.

Claim 26

The Examiner states, "Smith discusses about draining the tank in detail during cleaning in the "Background of the Invention" but teaches that draining the tank is not necessary during the cleaning process (col 10 lines 64-68, col 11 lines 22-30). The Applicants primary submission is that the Examiner, in citing columns 10 and 11 of Smith '479 is improperly mixing elements of a prior art process described at column 10 and a new (at the time) inventive process described at column 11 to find the elements of the Applicants' claims. Such a selection of elements from two entirely distinct processes does not support a valid rejection for anticipation. None of the processes disclosed in Smith '479, whether they be prior art or new, are the same as the claimed invention, so there is no anticipation.

The Examiner's first reference (col 10, lines 64-68) is drawn from the Background of the Invention section of Smith '479 and is part of a discussion of prior art methods, not the method of Smith's invention. The entire paragraph that this reference is drawn from is repeated below:

An obvious drawback of cleaning from the outside of a tube or fiber, rather than from the inside, is that to do so requires a shell. If there is no shell, as in a frameless array such as one disclosed in the '524 array must be removed from the process reservoir in which it operates and immersed in a cleaning solution in another tank. An alternative is to drain the process reservoir and to substitute cleaning solution; then drain the cleaning solution after cleaning, and refill the reservoir. As is evident, this is a highly undesirable alternative.

This entire passage relates to prior art methods involving "cleaning from the outside of a tube or fiber". The need to drain a tank or retentate follows from the need to re-fill the tank with a cleaning solution to apply a cleaning solution to the outside of the membranes. In contrast, Smith advocates, and describes as his invention, a method involving cleaning fibers from their lumens, or insides, without draining a tank.

The Examiner's next reference (col 11, lines 22-30) is the beginning of the Summary of Invention of Smith '479 and is repeated below:

Highly effective cleaning of a module containing an UF or a MF membrane having a fouled surface is obtained during an unexpectedly short period, without draining feed (substrate) from the module, by introducing a chosen cleaning fluid into the permeate and recycling it through the lumens at low pressure in the range from about atmospheric but no more than the bubble-point of the fiber. The method comprises maintaining a selected low pressure no more than the bubble-point...

Thus the method of Smith et al.'s invention differs in at least two ways from the prior art method discussed at column 10, lines 64-68. Firstly, the Smith invention involves applying a cleaning solution to the insides of the membranes. Secondly, Smith's process is performed without draining the tank.

The Appellant submits that these references do not support the Examiner's contention that Smith '479 anticipates claim 26. Instead, Smith discusses draining the tank only in relation to a prior art process. However, there is no disclosure in relation to that prior art process of all of the elements of claim 26, or even draining the tank at least once a week. Smith then discusses the process of his invention which is not the same as the prior art process and which explicitly does not involve any step of draining a tank. Reading these passages together does not provide a discussion of a process according to claim 26 but rather of two distinct processes, neither of which has the elements of claim 26.

The Examiner cites various cases for the propositions that a nonpreferred or disparaged embodiment may still be anticipatory. However, those cases only apply when a nonpreferred or disparaged embodiment provides all elements of the claim itself. None of the cases say that the Examiner can replace an element of a preferred embodiment with a disparaged element from a disparaged prior art process to form an anticipation rejection. None of the cited cases contradict the basic requirement that a reference, to anticipate, must disclose all of the claimed elements identically as claimed and arranged as in the claim. *In re Bond* 910 F.2d 831, 15 USPQ2d 1566 (Fed. Cir. 1990), page 832, right hand column, Section II, first paragraph. Smith '479 fails to disclose all elements of the claims, combined and arranged as described in the claims.

The Applicants further submit that the Examiner's other references also fail to disclose what the Examiner alleges of them. For example, the Examiner alleges that Figure 4 of Smith discloses wetting the membranes at least once a week with a cleaning fluid. However, in Figure 4, data points (2), (3) and (4) relate to simple backwashes with water only and there is about a 9 day gap between data

points (1) and (5). Accordingly, this allegation is incorrect. Further, the process of Figure 4 does not describe a process in which the tank is drained as part of a repeated cycle and so does not disclose wetting the membranes in a manner that meets all of the requirements of part (f) of claim 26.

The Applicants submit that the dependent claims are all allowable for at least the reasons given in relation to their parent claim 26. However, additional reasons why the dependent claims are allowable are given below.

Claim 27

Claim 27 requires, among other things, that the cycle of step (i) of claim 26, which includes a step of draining the tank of the retentate, be repeated at least once a day. The reference cited by the Examiner does not discuss draining a tank at all, much less at least once a day.

Claim 28

Claim 28 requires a step of performing recovery cleanings to increase the permeability of the membranes and states that the cleaning events of claim 26 are performed between the recovery cleanings to reduce the rate of a decline in the permeability of the membranes. Both steps, the recovery cleanings and the cleaning events are performed in the same process yet the Examiner again selects elements of two separate processes, the prior art process of column 10, lines 64-68 and Smith et al's process of column 11, lines 22-30, or column 13, lines 50-57 or column 18, lines 5-12. Further, none of these citations describes cleaning steps that reduce a rate of decline in permeability.

Claims 29 and 30

Regarding claims 29 and 30, none of the Examiner's references describe a weekly CT value (sum of the products of chemical concentration and duration of contact with the membranes for all steps of wetting the membranes with cleaning chemicals conducted in a week). The reference at col 11, lines 30-55 of Smith '479 describes a maximum duration of a cleaning event. The references to the

table and col 15 lines 34-36 give sample concentrations without suggesting an appropriate duration to be used with such a concentration. None of these references discuss how many cleanings of any particular duration or concentration would be done in a week. Finally the Examiner states, without any evidence, that "these ranges are optimizable". However, the potential optimization of ranges applies to obviousness, not anticipation. The claim has not, and could not, be rejected for obviousness because Smith teaches away from draining a tank which is an element of claims 29 and 30 through claim 26. Further, the Examiner has not established that CT is taught to be a result effective variable in the context of claim 26 nor that Smith '479 teaches a range within which a person skilled in the art would be obviously led to the claimed ranges through routine experimentation as would be required to make even an obviousness rejection. (MPEP 2144.05 II A and B)

Claim 31

Regarding claim 31, which describes recovery cleanings at least 1 month apart from each other, the Examiner refers to Figure 4. However, Figure 4 describes an experiment lasting only about 16 days. The Examiner cites col. 1, lines 18-22 but this passage only makes a vague reference to membranes being "periodically cleaned" and does not relate to the process of the Smith '479 invention but to a prior art process having "inside-out" flow whereas Smith '479 relates to "outside-in flow" (column 1, lines 23-25). The Examiner then asserts that discovery of an optimum value of a result effective variable in a known process is ordinarily within the skill of the art. However, claim 31 depends on claim 28 which, for the reasons given above, is not a known process and the time between recovery cleanings is not the optimum value of a result effective variable. Further, the doctrine cited by the Examiner relates to alleged obviousness, not anticipation, and the Examiner has not, and can not, reject claim 31 for obviousness because of its dependence on claim 26 and because the standards of MPEP 2144.05 II A and B are not met.

Claim 32

Claim 32 specifies that the permeate is intended for use as drinking water and that the cleaning chemical comprises an oxidant. The Examiner asserts that Smith '479 discusses purifying ground water (in column 20, lines 18-22) which could be a source of drinking water. However, the Examiner fails to provide prima facie evidence that Smith '479 teaches that the cleaning chemical is an oxidant in this case. Further, in the specific example of column 20, lines 18-22, the membranes were cleaned with citric acid (column 21, line 7). The Examiner then cites a portion of the reasons in *Ex parte Masham*, but the cited portion relates to apparatus claims whereas claim 32 is a process claim.

Claim 33

Regarding claim 33, the Examiner has not provided prima facie evidence that Smith discloses a process as in claim 26, with a weekly CT in the range specified in claim 29 wherein the steps of part (f) of claim 26 are performed at regular intervals and each have about the same product of concentration and duration. The Examiner merely references the "abstract and figures of Smith" which does not disclose a combination having all of the elements of the claims.

Claims 34

Claim 34 states that the membranes are backwashed with permeate after being wetted with a cleaning chemical and before starting a new cycle. The Examiner's reference to col 12, lines 26-68 simply fails to provide the elements of this claim.

Claims 35

Claim 35 recites, among other things, steps of flowing water to the permeate side of the membranes and mixing a cleaning chemical into the flowing water. The Examiner asserts that Smith '479 teaches mixing a chemical in a tank and then flowing it to the membranes. However, such a process in Smith '479 is not equivalent to, and does not disclose the steps of, mixing a cleaning chemical into water flowing to the membranes.

Claim 36

Claim 36 recites the use of hollow fiber membranes in the method of claim 26. The Appellants acknowledge that Smith '479 discusses hollow fiber membranes, but not as used in a process according to claim 26 on which claim 36 depends.

II. The Section 102(e) Rejection of Claims 26-28, 31 and 33-36 In Relation To Del Vecchio '251

The Applicants submit, in brief, that the Examiner's rejection, and the reference, simply fail to provide all elements of these claims combined and arranged as in the claims.

Claim 26

Claim 26 requires, among other things, wetting membranes with a cleaning chemical, while or after draining a tank of retentate, at least once a week. In relation to this element of the claim, the Examiner states, "frequency and duration – see column 12, lines 12-30". Column 12, lines 12-30 describe a "deep cleaning" process performed "once per month of normal operation or at more or less frequent intervals depending on the needs of the system and the rate at which a biofilm is generated". The Applicants submit that this reference nowhere mentions a frequency of at least once a week and so claim 26 is not anticipated.

Claim 27

Claim 27 states, among other things, that a cycle including a step of draining a tank, and a step of wetting membranes with a cleaning chemical are repeated at least once a day. The Examiner again recites the passage described above to a "deep cleaning" process (column 12, lines 19-20) performed once a month, more or less. The Examiner further cites a "pulsed cleaning" described at column 10, lines 4-8. The complete description of pulsed cleaning is provided at column 9, line 63 to column 10, line 8. It is clear that "pulsed cleaning" is not the same as "deep cleaning" and further, that "pulsed cleaning" may take about a minute and be performed twice per hour (column 10, lines 2-6) during normal operation of the system (column 9, line 64) and so does not involve draining a tank. Pulsed

cleaning also involves permeate (column 9, line 64), which is filtered water (column 4, lines 34-38) not a cleaning chemical. Accordingly, neither the "deep cleaning" nor the "pulsed cleaning" involve draining a tank at least once a day.

Claims 28 and 31

Claims 28 and 31 describe additional steps of performing recovery cleanings to increase membrane permeability and that the steps of claim 26 occur between these recovery cleanings to reduce a rate of decline in membrane permeability between recovery cleanings. To provide the recovery cleaning element, the Examiner refers to "deep cleaning" or a modified version of "deep cleaning" described at column 12, lines 30-40. However, this "deep cleaning" is the same process that the Examiner alleged provided step (f) of claim 16. The same disclosure cannot simultaneously anticipate both the cleaning steps of claim 16 and the additional cleaning steps of claims 28 and 31.

Claim 33

Claim 33 depends on claim 29. The Examiner has not rejected claim 29 as being anticipated nor alleged that all of its elements are found in Del Vecchio '251. Accordingly, claim 33 cannot be anticipated.

Claim 34

The Examiner's reference to column 12, lines 30-40, describes pulsed cleaning (backwashing) during the deep cleaning which the Examiner alleges provides step (f) of claim 26. In contrast, claim 34 requires backwashing after the claim 26, step (f) cleaning step.

Claim 35

The Examiner's reference is to a flow of water "into compartment 214" (column 11, lines 60-62). This flow occurs through lines 288, 282, 292 and 296 (column 11, line 61) of Figure 3 (column 11, lines 47-49). It is apparent from Figure 3 that flow through these lines puts water into the part of compartment 214 that is

defined as the retentate side of the membranes in claim 26. Claim 35, in contrast, recites a flow of water to the permeate side of the membranes.

Claim 36

The Applicants acknowledge that Del Vecchio '251 describes hollow fiber porous membranes but repeat their submissions above that Del Vecchio '251 does not provide all elements of claim 26.

III. The Section 103 Rejection of Claims 29, 30 and 32

The Applicants' arguments in brief are that Del Vecchio '251 does not provide the elements of claim 26, that Smith '479 does not provide the additional elements of claims 29, 30 and 32 and that there is no teaching towards the combination of these two references that would produce the claimed process.

Claims 29 and 30

The Examiner applies Del Vecchio to claim 26. For the reasons given above, the Applicants submit that Del Vecchio '251 does not provide all of the elements of claim 26.

The Examiner provides no discussion as to where the additional elements of claims 29 and 30 are provided in either reference or evidence of a teaching towards a combination of references. Accordingly, the Examiner has failed to provide a prima facie case of obviousness. The Applicants further repeat and rely on their comments in relation to claims 29 and 30 in traversing the rejection of these claims for anticipation in view of Smith '479.

Claim 32

The Examiner cites *In re Otto* which relates to claims describing an apparatus and a process of making an apparatus. In contrast, claim 32 is a process of filtering water to produce a permeate intended as drinking water. This is a patentable limitation in that it describes the process by the physical and or chemical nature of its product. The Examiner has not established that Smith teaches cleaning with hypochlorite while producing drinking water citing only "the

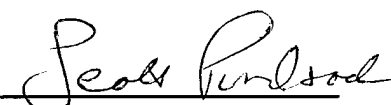
examples". The Applicants submit that there is no example in Smith '479 in which hypochlorite is used to clean membranes in a process producing drinking water.

Summary

For the foregoing reasons, the Appellants believe that the Examiner's rejections of claims 26-36 were erroneous and reversal of his decision is respectfully requested.

Respectfully submitted,

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CLAIMS APPENDIX

26. A process for filtering water containing solids with membranes in a tank comprising the steps of:

a) filling the tank with a feed water to be filtered to immerse the membranes;

b) creating a transmembrane pressure between a permeate side and a retentate side of the membranes, the retentate side of the membranes being in contact with the water in the tank at ambient pressure, the permeate side being subject to a negative pressure relative to the pressure of the water in the tank fluidly connected to a filtered permeate outlet, to generate a filtered permeate at the permeate outlet and a retentate in the tank;

c) aerating the membranes to dislodge solids from the membranes;

d) backwashing the membranes; and,

e) draining the tank of the retentate;

wherein

i) the steps above are performed in repeated cycles; and,

ii) the steps of backwashing the membranes and draining the tank in a cycle may be performed either before the other or partially or substantially simultaneously; and,

f) wetting the membranes at least once per week with a cleaning chemical having a selected concentration for a selected duration after performing step (b) in a first cycle and after or while performing step (e) in the first cycle, without returning to step (b) in the first cycle and before starting a subsequent cycle.

27. The process of claim 26 wherein the repeated cycles of part (i) of claim 26 are repeated at least once a day and step (f) is repeated between once a day and once per cycle of part (i) of claim 26.

28. The process of claim 26 further comprising the steps of performing recovery cleanings from time to time to increase the permeability of the membranes wherein the steps of claim 26 are performed between the recovery cleanings and reduce the rate of a decline in permeability of the membranes between the recovery cleanings.

29. The process of claim 26 wherein the sum of the products of the selected concentration and selected duration of part (f) of claim 26 is between 2,000 min•mg/l and 20,000 min•mg/l per week over a period of at least 1 month when NaOCl is the cleaning chemical or an equivalent product of concentration and time of another cleaning chemical.

30. The process of claim 29 wherein the sum of the products of the selected concentration and selected duration of part (f) of claim 26 is between 5,000 min•mg/l and 10,000 min•mg/l per week over a period of at least one month when NaOCl is the cleaning chemical or an equivalent product of concentration and time of another cleaning chemical.

31. The process of claim 28 wherein the recovery cleanings are performed at least 1 month apart from each other.

32. The process of claim 28 wherein the filtered permeate generated at the permeate outlet is intended for use as drinking water and the cleaning chemical comprises an oxidant.

33. The method of claim 29 wherein the steps of part (f) of claim 26 are performed at regular intervals and each have about the same product of selected concentration and selected duration.

34. The method of claim 26 wherein the membranes are backwashed with permeate in the first cycle after step (f) of claim 26 in the first cycle and before starting the subsequent cycle.

35. The method of claim 26 wherein step (f) of claim 26 further comprises the steps of flowing water to the permeate side of the membranes and mixing a cleaning chemical into the flowing water.

36. The method of claim 26 wherein the membranes are hollow fibre porous membranes.